Exercise 32

For the following exercises, given each set of information, find a linear equation satisfying the conditions, if possible.

$$(2, 4) \text{ and } (4, 10)$$

Solution

The general formula for the equation of a line is

$$y = mx + b.$$

The first condition says that when $x = 2$, $y = 4$.

$$4 = m(2) + b$$

The second condition says that when $x = 4$, $y = 10$.

$$10 = m(4) + b$$

This is a system of two equations with two unknowns that can be solved.

$$\begin{cases} 2m + b = 4 \\ 4m + b = 10 \end{cases}$$

Subtract the respective sides of these two equations to eliminate b.

$$2m - 4m = 4 - 10 \quad \rightarrow \quad -2m = -6 \quad \rightarrow \quad m = 3$$

Multiply both sides of the first equation by -2

$$\begin{cases} -4m - 2b = -8 \\ 4m + b = 10 \end{cases}$$

and then add the respective sides of these two equations to eliminate m.

$$-2b + b = -8 + 10 \quad \rightarrow \quad -b = 2 \quad \rightarrow \quad b = -2$$

Now that m and b are solved for, the equation of the line is known.

$$y = 3x - 2$$